Apr 5th, 11:30 AM - 1:30 PM

Southern Resident killer whales: from captivity to conservation

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Southern Resident Killer Whales: From Captivity to Conservation

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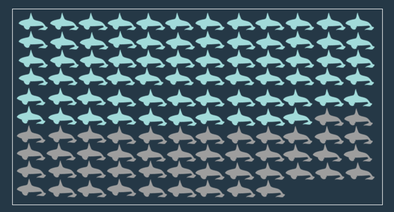
The Legacy of Captivity

Between 1962 and 1977, at least 275 (up to 307) killer whales were captured in the waters off Washington State and British Columbia. At least 47 individual SRKWs were sold to marine parks or died during the capture effort - approximately 40% of their population. Juveniles were disproportionately targeted, effectively removing an entire generation. From an estimated historic size of more than 200 whales, the SRKWs had just 70 individuals in 1974.



The Rise of Modern Threats

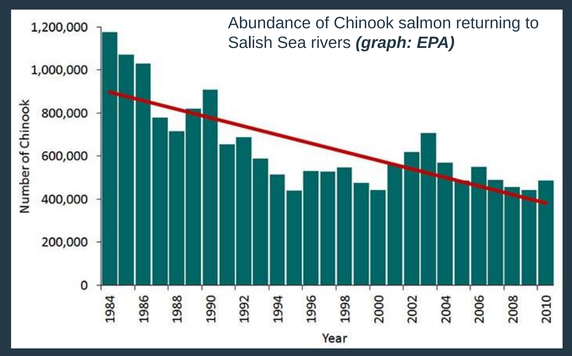
While capture efforts directly decreased the SRKW population, new threats to their survival emerged. The cumulative impact of these threats causes a negative feedback loop, further impeding recovery and increasing stress. A lack of prey causes individuals to metabolize blubber, releasing stored contaminants and compromising reproductive and immune systems. Research indicates that about 69% of detected pregnancies were lost due to nutritional stress; other studies have found correlations between declining salmon stocks and high SRKW mortality rates.

ABSTRACT

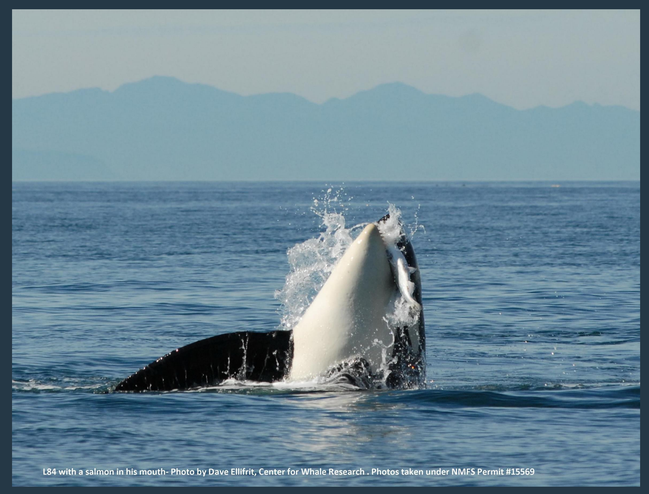
The endangered Southern Resident killer whale (*Orcinus orca*) (SRKW) population remains the only killer whale population listed under the United States Endangered Species Act in U.S. waters since it was added in 2005. In the 1960s and 70s, the population was reduced by approximately 40% following intensive efforts to capture individuals for a growing marine park captivity industry. The first Northwest killer whale census (1974) found just 70 remaining individuals in the SRKW community. This population has struggled to return to pre-capture numbers, and in the face of new threats including prey depletion, toxic contamination, and vessel effects, fewer than 80 individuals remain today. Over the last 40 years, this unique killer whale community has transitioned from targets of the captivity industry to one of the most iconic wild species of the Pacific Northwest, but is now desperately in need of meaningful and effective conservation efforts. As threats to this population have changed, environmental and advocacy groups have revised their strategies from a focus on separate issues to a recognition of the need for an ecosystem approach to ensure the long-term recovery and survival of these iconic killer whales. Recent research indicates that ecosystem-based efforts drive quicker recovery of ecosystems and endangered species. This innovative method has led to new partnerships with groups from disparate backgrounds working together to address multiple issues in the Pacific Northwest to recover the SRKWs and their habitat - in particular addressing the threat of prey depletion for the SRKWs by working for salmon restoration. By focusing on the role of whales in the ecosystem and their needs, we can increase conservation efforts for the SRKWs and demonstrate the potential of ecosystem-based management.

The Salmon Issue

- Chinook salmon have **declined dramatically** throughout the Pacific Northwest.
- The major river systems utilized by the SRKWs include the Fraser, Puget Sound rivers, Columbia/Snake, Klamath, and Central Valley.
- Salmon have been decimated by **the four H's:** hydropower, harvest, habitat loss, and hatchery effects.
- Dams have a significant impact on salmon populations by **blocking migration routes, destroying habitat, and altering the flow of rivers.**
- British Columbia salmon stocks are estimated to be 36% of their historic size; Puget Sound stocks 8%; and Columbia River 2%.



Southern Resident Killer Whales



L84 with a salmon in his mouth- Photo by Dave Ellifrit, Center for Whale Research . Photos taken under NMFS Permit #15569

A *Distinct Population Segment* of killer whales in the Eastern North Pacific
Three pods: J, K and L
Range: Central California to Southeast Alaska; Salish Sea
Diet: fish, predominantly Chinook salmon (79.5% of summer diet)
Status: **critically endangered**
Threats: Prey depletion, toxic contamination, vessel effects (noise and harassment), oil spill risk, small population size (disease and inbreeding)
As of October 1st, 2017: 76 individuals remaining
J pod:23, K pod:18, L pod:35

The Orca Salmon Alliance

- A diverse coalition of research and advocacy groups working together to address the decline of SRKWs and salmon in the PNW **by protecting the entire ecosystem.**
- Focuses on the interactions and connections between ecosystem elements and offers a new perspective on conservation issues.
- Encourages **new partnerships and collaborative efforts** between multiple sectors: advocates, managers, and policy-makers.
- Works to increase knowledge and improve communication about the source of threats and create new opportunities for involvement.
- Creates public knowledge and engagement to influence policy.

ORCA SALMON ALLIANCE

Ecosystem-based Recovery

Ecosystems are complex, and recovery requires a holistic approach based in environmental knowledge, with coordination and partnerships between agencies and sectors, public education and involvement, connections between science and policy, and adaptive management. Isolated, single-issue management does not address the source of threats and does not contribute to long-term survival.

Endangered Species Act: "The purposes of this Act are to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved…" (ESA section 2(b))

Marine Mammal Protection Act: "..efforts should be made to protect essential habitats… from the adverse effects of human actions" (MMPA section 2(2))

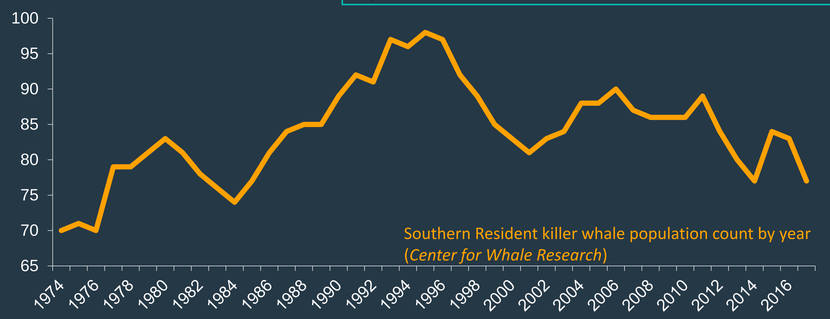
US Commission of Ocean Policy: "A comprehensive and coordinated national ocean policy requires moving away from the current fragmented, single-issue way of doing business and toward ecosystem-based management."

Ecosystem approach to endangered species recovery: Southern Resident killer whales and salmon

- Recognize and address **cumulative impacts.**
- Research indicates that restoring predator and prey species together is almost always more efficient than sequential recovery. **The sequence of restoration matters when one target is eaten by another.** "Slow or failed recoveries may be the result of predator-first approaches in which specialist predators do not have access to a readily available and abundant prey base." *(Samhouri et al. 2017)*.
- **Habitat restoration** benefits salmon and helps to reduce toxin loads.
- Critical habitat designation creates the "umbrella effect" of additional protection for important prey species.
- Ecosystem recovery is necessary to ensure long-term survival of the SRKWs, but their decline and critical status requires EBM to be paired with short-term, immediate impact actions.

Recommendations:

- **Immediate measures to improve salmon survival** (spill, floodgates, culverts) and local availability, and continued efforts to rebuild wild salmon populations (habitat, long-term dam operations).
- **Interagency and transboundary cooperation** to address salmon, habitat, and pollution.
- Apply research to developing concrete actions through **adaptive management.**
- Expand critical habitat and identify **essential habitat features**.
- Address **point and non-point** source pollution.
- Develop and enact **measurable, ecologically relevant** noise reduction goals.



Southern Resident killer whale population count by year (*Center for Whale Research*)

1911 Estimated birth year of Granny, oldest known killer whale

1916 Dam construction begins in Klamath Basin

1933 Dam construction begins in Columbia Basin

1945 DDT now available for widespread use

1960s DDT and PCBs reach peak concentrations in Puget Sound; rise of commercial shipping begins

1962 WA State capture era begins; dam construction starts on Snake River

1964 Last of the four Klamath River dams completed

1971 Columbia River mainstem dams completed

1972 DDT banned in the U.S.; MMPA created

1974 First orca census counts just **70** SRKWs

1975 Four Lower Snake River dams finished

1976 WA State bans live captures; Orca Survey begins

1979 U.S. bans PCBs

1995 98 SRKWs, highest count in 40+ years

1999 12 runs of Pacific Northwest salmon listed under Endangered Species Act

2002 Stockholm Convention on POPs signed

2002 SRKWs listed under Species at Risk Act (SARA) in Canada

2005 Listed under Endangered Species Act in U.S.

2006 U.S. establishes critical habitat

2008 NMFS Recovery Plan is published; WA state restricts PBDEs

2009 Ambient ocean noise has increased by up to 12 dB since 1960s

2011 Dept. of Fisheries and Oceans Recovery plan published; NMFS enacts vessel regulations; Elwha River dam removal begins

2012 WA State matches vessel regulations

2016 Granny dies, estimated 105 years old

2017 Nine deaths in past two years, 0 successful births. **76 SRKWs** remain

Acknowledgements:
Co-authors and colleagues at WDC
Partners in the Orca Salmon Alliance
Center for Whale Research scientists, staff, and volunteers for tireless work and decades of information
Jessica Rekos Foundation for their support and dedication

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